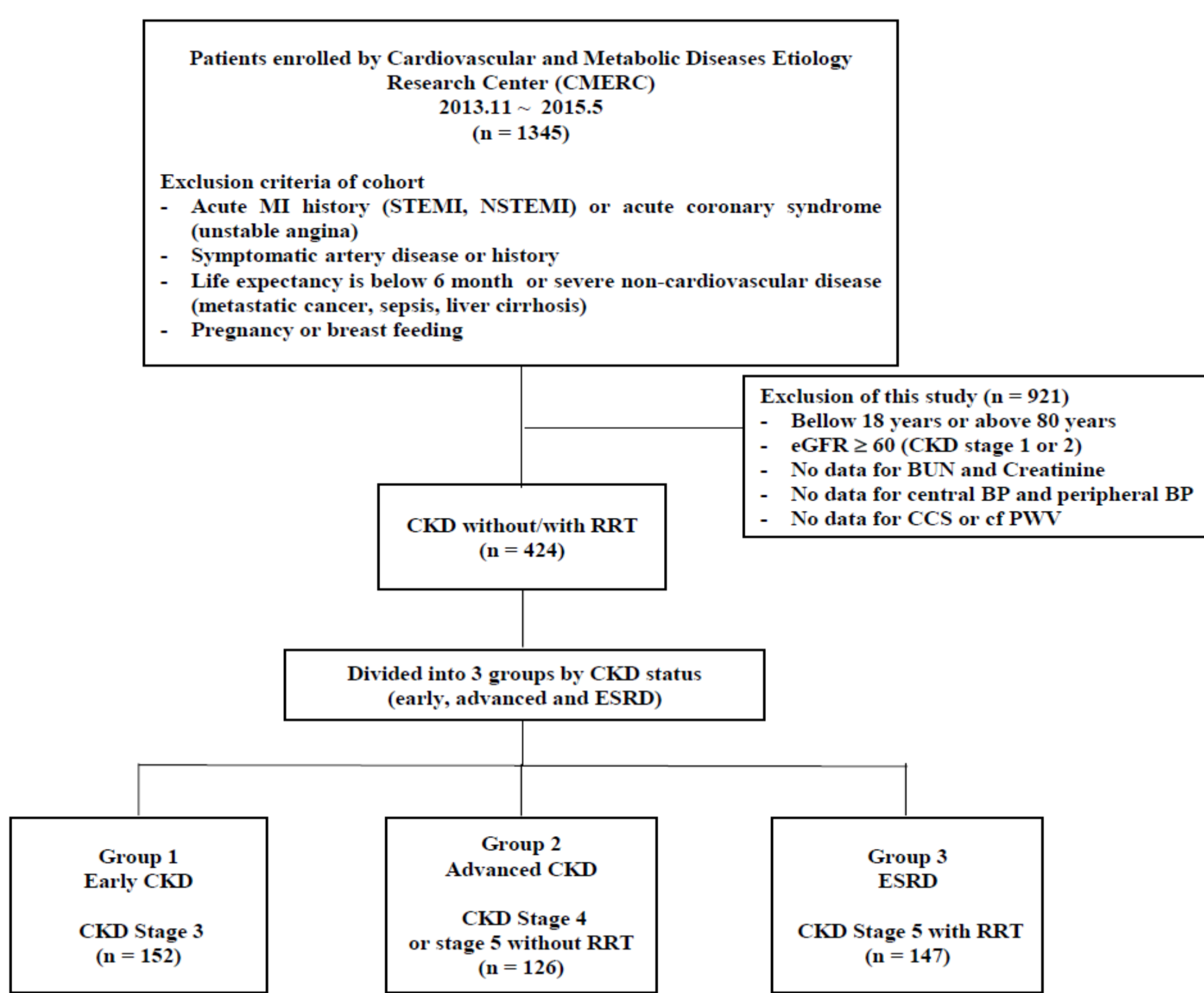


Background

Hypertension is an established cardiovascular risk factor and is closely related with mortality in chronic kidney disease patients. Recent studies demonstrated central blood pressure was a significant predictor of cardiovascular disease and had stronger relationship with vascular damage such as vascular calcification and stiffness than peripheral blood pressure. This study aim to evaluate the association of CBP or PBP with target organ damage markers measured by pulse wave velocity and coronary calcium score in CKD patients including end-stage renal disease according to renal function.

Methods



Blood pressure measurement

- Central blood pressure : By radial artery applanation tonometry (SphygmoCor of AtCor medical)
- Peripheral blood pressure : By automated digital oscillometric sphygmomanometer in sitting position, 3 times of 5 minutes interval

Target organ damage markers measurement

- Carotid femoral pulse wave velocity (cfPWV) : SphygmoCor device
- Coronary calcium score (CCS) : Coronary Computed tomography

Results

Table 1. Baseline characteristics of study population according to CKD stage

	Total (n=424)	Group 1 (n=156)	Group 2 (n=121)	Group 3 (n=147)	P-value
Age (year)	59 ± 12.4	62 ± 11.1	60 ± 11.7	54 ± 12.8	<0.001*
Gender, male (%)	248 (58.4%)	100 (64.1%)	61 (50.4%)	87 (59.2%)	0.071
BMI (kg/m ²)	24.8 ± 3.9	25.5 ± 3.7	24.7 ± 3.9	24.0 ± 3.8	0.003*
Hypertension, n (%)	356 (84.0%)	137 (87.8%)	104 (86%)	115 (77.7%)	0.059
Diabetes, n (%)	159 (37.4%)	56 (35.7%)	54 (44.6%)	50 (35.1%)	0.156
Dyslipidemia, n (%)	178 (41.9%)	73 (46.8%)	58 (47.9%)	47 (33.8%)	0.010**
Current smoker, n (%)	216 (50.7%)	69 (44.2%)	74 (61.2%)	73 (49.3%)	0.019**
eGFR (mL/min/1.73m ²)	24.5 ± 18.9	46.1 ± 9.5	17.8 ± 6.5	5.7 ± 2.8	<0.001*
BUN (mg/dL)	43.2 ± 21.5	25.6 ± 7.3	49.0 ± 17.3	57.6 ± 21.8	<0.001*
Creatinine (mg/dL)	4.9 ± 4.2	1.5 ± 0.3	3.5 ± 1.3	9.9 ± 3.3	<0.001*
Total cholesterol (mg/L)	167.5 ± 39.6	168.6 ± 43.3	168.2 ± 37.1	165.6 ± 37.5	0.794
HDL cholesterol (mg/L)	46.3 ± 21.5	46.7 ± 14.2	45.0 ± 18.2	46.9 ± 30.2	0.750
LDL cholesterol (mg/L)	90.9 ± 30.4	92.8 ± 31.6	90.1 ± 29.9	89.4 ± 29.4	0.620
Triglyceride (mg/L)	140.8 ± 97.9	154.4 ± 115.7	145.9 ± 71.8	120.3 ± 93.9	0.013**
Calcium (mg/L)	8.9 ± 0.7	9.1 ± 0.4	8.8 ± 0.6	8.8 ± 0.9	<0.001*
Phosphate (mg/L)	4.1 ± 0.9	3.6 ± 0.5	4.04 ± 0.6	4.8 ± 1.1	<0.001*
Albumin (g/dL)	3.9 ± 0.5	4.2 ± 0.3	3.9 ± 0.4	3.7 ± 0.5	<0.001*
Glucose (mg/dL)	109.5 ± 36.9	110.8 ± 30.2	109.6 ± 43.5	108.2 ± 37.8	0.833

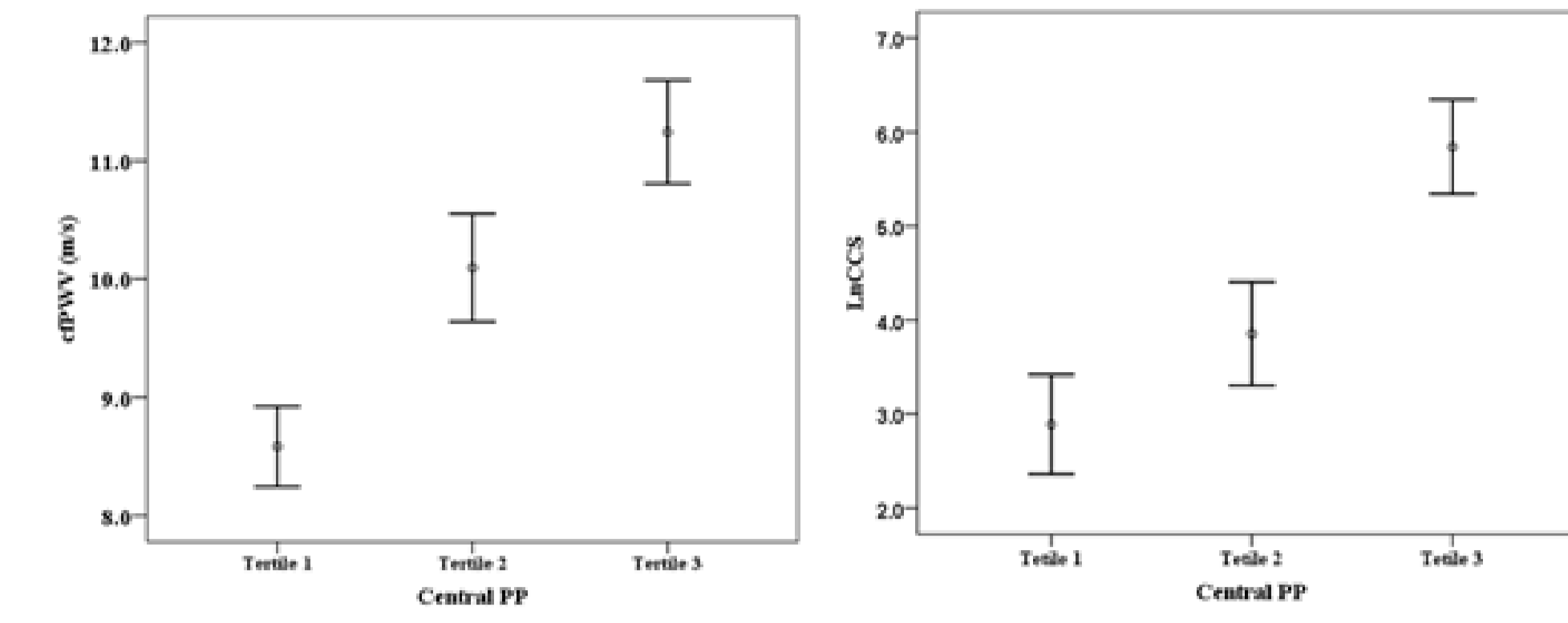
*<0.01, among three groups; **<0.05, among three groups; Data are expressed as mean ± standard deviation, or number of patients (percent)

Table 2. Profiles of blood pressure values and target organ damage markers according to CKD stage

	Total (n=424)	Group 1 (n=156)	Group 2 (n=121)	Group 3 (n=147)	P-value
Central SBP (mmHg)	132.7 ± 25.5	119.6 ± 16.9	130.5 ± 21.0	148.7 ± 27.8	<0.001*
Central DBP (mmHg)	77.9 ± 11.7	75.5 ± 9.6	77.1 ± 10.1	81.4 ± 13.9	<0.001*
Central PP (mmHg)	54.8 ± 20.6	44.1 ± 13.5	53.5 ± 19.3	66.9 ± 21.8	<0.001*
Peripheral SBP (mmHg)	135.7 ± 21.9	126.8 ± 15.4	137.4 ± 19.7	143.8 ± 25.8	<0.001*
Peripheral DBP (mmHg)	77.5 ± 11.7	75.5 ± 9.9	76.7 ± 11.1	80.2 ± 13.3	0.001*
Peripheral PP (mmHg)	58.2 ± 19.5	51.2 ± 13.2	60.7 ± 20.7	63.6 ± 21.8	<0.001*
cfPWV (m/sec)	9.9 ± 2.7	9.8 ± 2.7	10.0 ± 2.8	10.2 ± 2.7	0.505
Ln(CCS)	3.98 ± 3.01	3.52 ± 2.99	3.70 ± 3.1	5.96 ± 2.11	<0.001*

*<0.01, among three groups; **<0.05, among three groups; SBP: systolic blood pressure, DBP: diastolic blood pressure, PP: pulse pressure, cfPWV: carotid-femoral pulse wave velocity, CCS: coronary calcium score. Ln(CCS): log transformation of CCS

1) Central SBP and target organ damage markers



2) Central PP and target organ damage markers

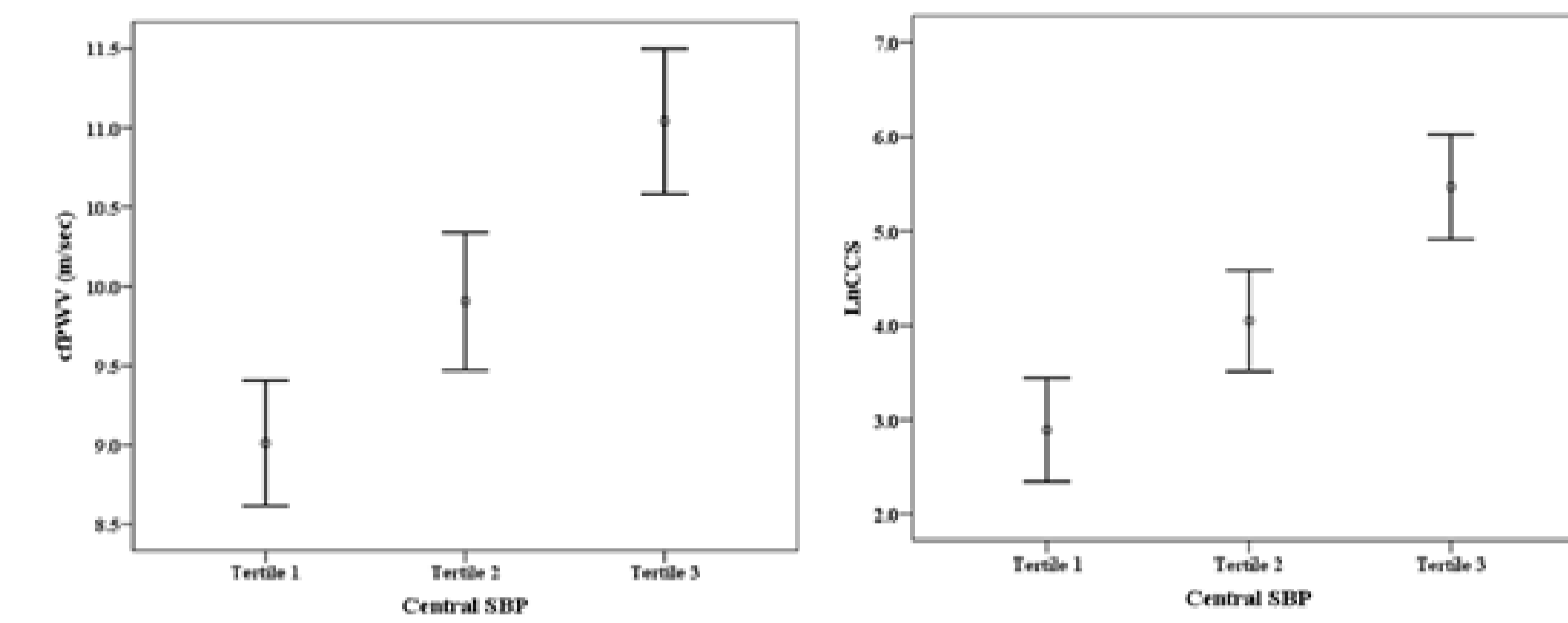
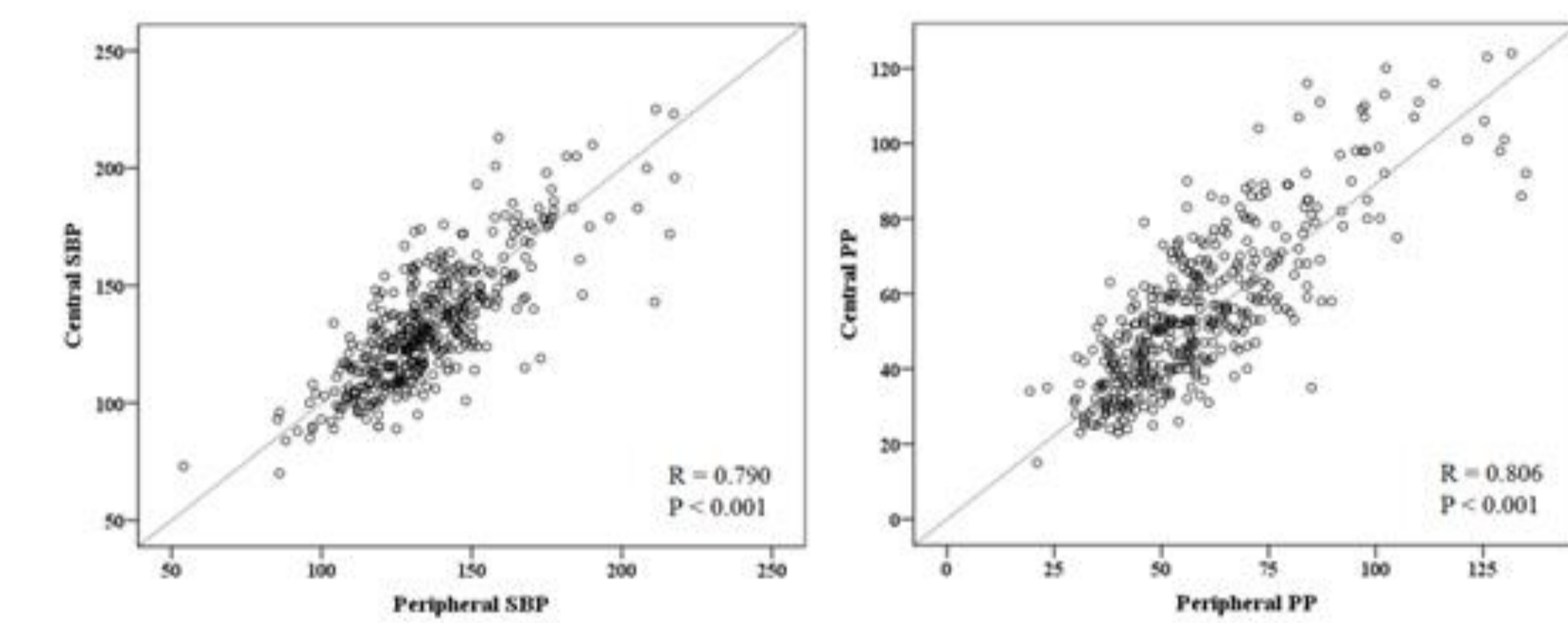
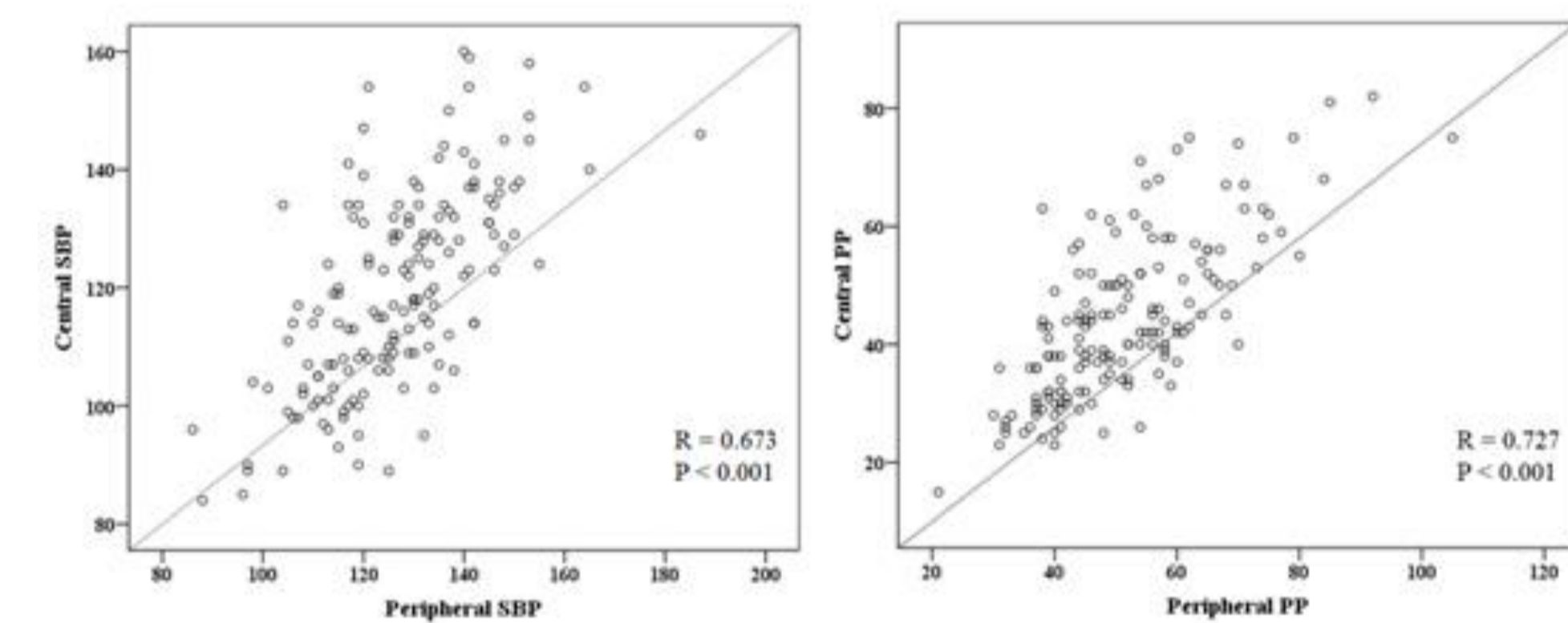


Figure 2. Comparison of target organ damage markers along the CBP in CKD patients

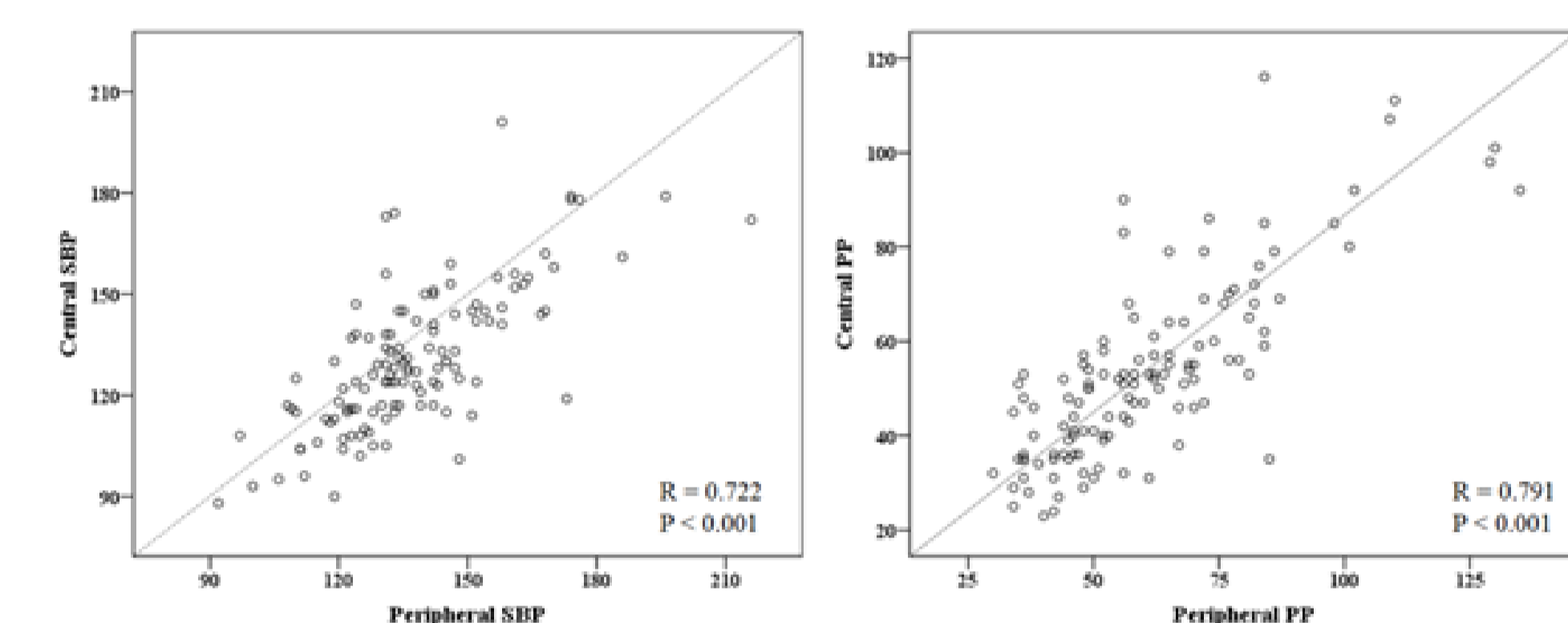
A) Total study subjects



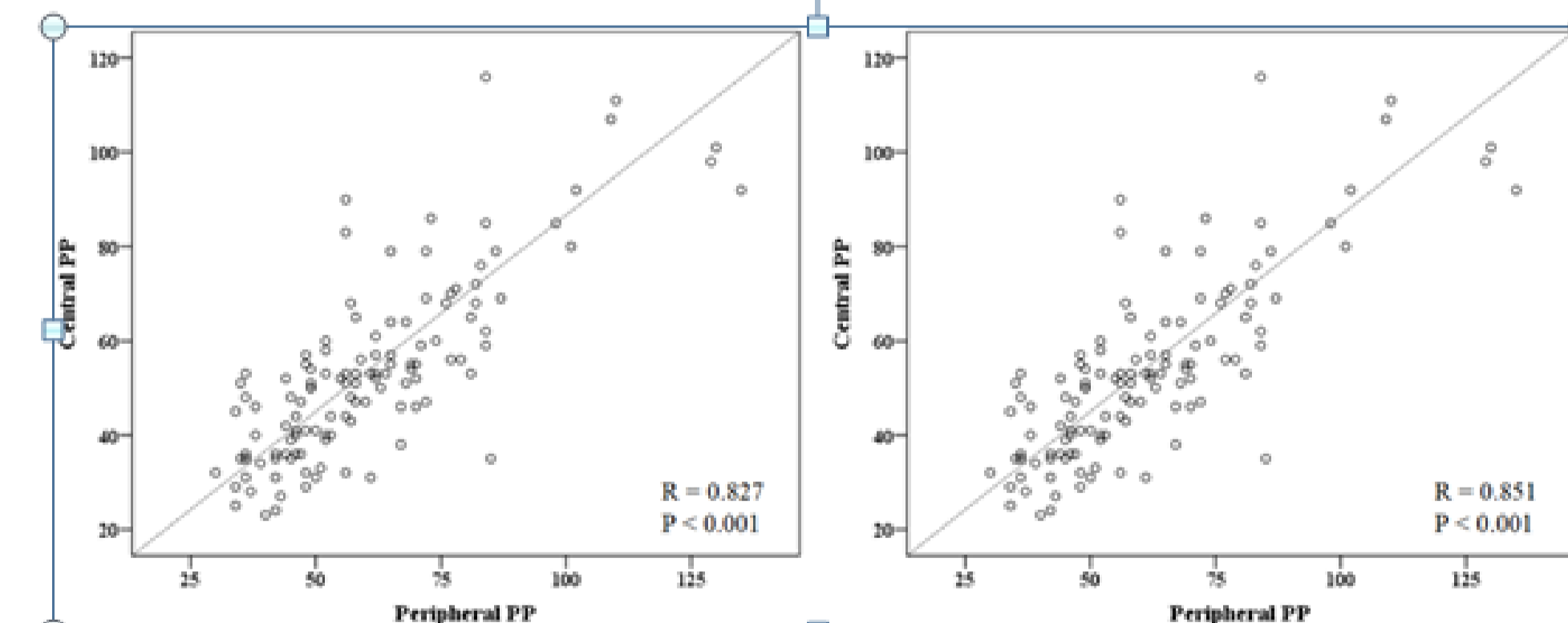
B) Group 1



C) Group 2



D) Group 3



R : Pearson's correlation coefficients; All correlation were significant (P < 0.001)

Figure 3. Concordance of correlation coefficients between CBP and PBP values

Conclusion

Central SBP and PP are significantly associated with target organ damage markers in CKD patients. In addition, central SBP has stronger associations with CCS and PWV compared to peripheral SBP in CKD patients without dialysis. However, CBP is not superior to PBP for predicting target organ damage in ESRD patients.